



*Published to advance the Science of cold-blooded vertebrates*

ON THE DIFFERENTIAL CHARACTERS  
BETWEEN *MUSTELUS HENLEI* AND  
*MUSTELUS CALIFORNICUS*.

*Mustelus henlei* (Gill) is not commonly recognized on our coast, being passed over as *Mustelus californicus* which it strikingly resembles.

The fact that these two forms have been considered under separate genera, is perhaps somewhat responsible for their being confused by collectors. One naturally looks for greater differences than those that exist between these two, in species belonging to separate genera. Should the future, however, show that the young of *Mustelus henlei* is without the so-called placenta, it must perforce be considered generically different from *Mustelus californicus*.

The character of the teeth has been considered of sufficient weight for referring these species to different genera, but the dental differences between them are so small that a lens is necessary to distinguish them. The slight basal denticle in *Mustelus henlei* is not present on all of the teeth, and sometimes there is a slight blunt suggestion of this denticle in *Mustelus californicus*.

The distinguishing characters between these species is here pointed out hoping that the easy recognition and separation of the species may lead to a bet-

ter knowledge of their distribution and comparative abundance. At present we know only that *Mustelus californicus* is reported from San Francisco to the Gulf of California, but whether both species are included in this range, or whether *Mustelus henlei* is the commoner form in the northern part of it is uncertain.

Garman (Mem. Mus. Comp. Zool. XXXVI), distinguishes *Mustelus henlei* and presents a very good plate of it, but he does not separate it very well from *Mustelus californicus*.

I recently rather hastily examined Gill's type at the National Museum—a young specimen nine and a half inches in length, with the umbilical scar rather fresh, and compared it with the young of *Mustelus californicus* of similar size. I concluded that they were very doubtfully separable. Since then, however, I have had occasion to examine all of the adult specimens at Stanford University that I had supposed were referable to *Mustelus californicus*, and have found both of these species represented and rather easily separated.

In *Mustelus henlei* the base of the anal is even with, or only slightly posterior to, the base of the second dorsal. In *Mustelus californicus* the anal is behind the second dorsal, a distance nearly or quite equal to the long diameter of the eye.

In *Mustelus henlei* the dorsal is more anteriorly placed. The distance from its origin to the last gill opening is equal to the length of the snout, while in *Mustelus californicus* this distance is equal to two-thirds or three-fourths of the length of the head.

In *Mustelus henlei* the tips of the pectorals when laid close to the body reach at least to opposite the middle of the dorsal base, while in *Mustelus californicus* they scarcely reach to under the anterior fourth of the dorsal base.

In *Mustelus henlei* the sides of the mandible are slightly convex; in *Mustelus californicus* they are concave.

One may appreciate with the naked eye that the teeth of *Mustelus henlei* are somewhat sharper. With the aid of a lens, a slight basal cup may be seen on each side of most of the middle upper teeth, and on the outer side of the lateral upper teeth. These are scarcely developed on the lower teeth. In *Mustelus californicus* the teeth are smooth, blunt, and not at all cusped.

In *Mustelus henlei* each scale on the side of the body has a projecting spine at the tip, while at each side of it is a small basal spine. That is, the scale is tricuspid. In *Mustelus californicus* the edge of the scale is entire. A strong lens is necessary to show these characters.

*Mustelus lunulatus*, with which *Mustelus californicus* intermingles along the Lower California coast, has the fins much as in *Mustelus henlei*, and the teeth and mandible contour as in *Mustelus californicus*. It may be known from them at once by the lower lobe of the caudal projecting in a rather sharp angle. In the other two species the posterior edge of the caudal below the notch is regularly concave without the lower lobe being produced.

My material was:

*Mustelus henlei*. Three specimens from San Francisco, 15 to 26 inches long.

*Mustelus californicus*. Six specimens from 23 to 32 inches long. Four of them from San Diego, one from Ensenada, Lower California, and one from Magdalena Bay, L. C.

*Mustelus lunulatus*. Three specimens from 19 to 25 inches in length. One from Mazatlan, Mexico, and two from Panama.

EDWIN CHAPIN STARKS,  
Stanford University, Cal.

## AMPHIBIANS AND REPTILES OF LEHIGH COUNTY, PENNSYLVANIA.

We offer the following list with localities at which we met with the various species during the past seven years or so. No special attempt was made to gather all the material we encountered, and unfortunately in the case of most well-known or common species, particular localities were seldom recorded. Doubtless several other forms will be discovered eventually within our limits.

A few records have appeared in several of the State Bulletins of the Department of Agriculture by the former State Zoologist, H. A. Surface, such species being indicated below by the asterisk.

The rattlesnake, *Crotalus horridus* Linnaeus, does not appear in any of the books with reference to Lehigh County, though formerly it was abundant.

*Ambystoma maculatum* (Shaw). Mountainville.

*Ambystoma jeffersonianum* (Green). Mountainville.

*Hemidactylium scutatum* Tschudi. Summit Lawn.

*Plethodon erythronotus* (Green). Allentown, Mountainville, Slatedale, Laury's.

*Plethodon glutinosus* (Green). Summit Lawn.

\**Gyrinophilus porphyriticus* (Green). Allentown, Aineyville, Summit Lawn.

\**Spelerpes bislineatus* (Green). Allentown, Aineyville, Summit Lawn, Slatedale.

*Spelerpes longicauda* (Green). Allentown.

\**Spelerpes ruber* (Daudin). Allentown, Aineyville, Summit Lawn, Vera Cruz.

\**Desmognathus fusca* (Rafinesque). Allentown, Aineyville, Summit Lawn, Emaus, Slatedale.

*Diemictylus viridescens* (Rafinesque). Allentown, Mountainville, Emaus, Slatedale.

*Bufo americanus* Holbrook. Allentown, Lanark, Emaus, Slatedale, New Tripoli.

*Acris gryllus crepitans* (Baird). Hosensack.

*Hyla pickeringii* (Holbrook). Allentown, Mountainville, Slatedale.

\**Hyla versicolor* Le Conte. Allentown, Mountainville, Lanark.

*Rana pipiens* Schreber. County Home, Coopersburg.

*Rana catesbiana* Shaw. Aineyville, Mountainville, Lanark, Slatedale.

*Rana clamata* Daudin. Mountainville, Lanark.

*Rana palustris* Le Conte. Allentown, Aineyville, Lanark, Emaus.

*Rana sylvatica* Le Conte. Aineyville, Emaus, Lehigh Gap, New Tripoli.

\**Natrix sipedon* (Linnaeus). Allentown, Lanark, Guthsville.

*Elaphe obsoletus* (Say). Friedensville, Lanark.

*Storeia dekayi* (Holbrook). Allentown.

*Liopeltis vernalis* (Harlan). Slatedale.

\**Diadophis punctatus* (Linnaeus). Slatedale.

\**Coluber constrictor* Linnaeus. Rittersville, Lanark.

*Thamnophis sirtalis* (Linnaeus). Allentown, Lanark.

\**Lampropeltis doliatus triangulus* (Daudin). Aineyville, Shimerville.

*Agkistrodon contortrix* (Linnaeus). Allentown.

*Chelydra serpentina* (Linnaeus). County Home, Lanark.

*Kinosternon pensylvanicum* (Gmelin). Guthsville.

*Sternothoerus odoratus* (Latreille). Allentown, Lanark, Limeport, Hosensack.

*Chrysemys picta* (Schneider). County Home, Lanark.

*Clemmys mühlenbergii* (Schoepff). Emaus, Macungie.

*Clemmys insculpta* (Le Conte). Mountainville, Macungie, Lehigh Gap.

*Clemmys guttata* (Schneider). Allentown, Lanark, Hosensack, Lehigh Gap, New Tripoli.

*Terrapene carolina* (Linnaeus). Mountainville, Shimerville, New Tripoli.

E. S. AND W. I. MATTERN,  
Allentown, Pa.

#### STRAY NOTES ON TERRAPENE CAROLINA.

Dr. F. A. Lucas of the American Museum of Natural History has called the writer's attention to an account by Edmund G. Koch, Williamsport, Pa., in *Forest and Stream* for August 3, 1907, p. 170, of a Box Turtle marked in 1866, 76, 90 and still living in 1907, proving for that individual a length of life over 41 years. Probably, this is exceptional longevity for the species in its natural state. Last summer (1916), an old turtle came under the writer's observation at Mastic, Long Island, which had been initialed and dated 84, 96 and 99. This would give the turtle an age of over 32 years. It was obviously much older than the ordinary run of full grown turtles, its shell being smooth, the growth-rings on the scales which are generally noticeable, practically obliterated by wear. It was small for an adult, the plastron  $4\frac{5}{8}$  inches long. Excellent photographs of this specimen are on file in the American Museum of Natural History, New York. The writer has seen another old Box Turtle of moderate size (plastron  $5\frac{1}{4}$  inches), taken at Mastic, 1914, marked W. F. 92, which would give it an age of at least 22 years. Mr. William Flowd of Mastic whose initials also ac-

company the 84 on the 32-year turtle, marked a number of them at that period, and agrees that there is every reason to believe in the authenticity of the dating on both. Another pretty surely authentic one taken recently, July 1, 1917, was marked C. R. [Charles Ross] 04, making it over 13 years old. This last had the growth-rings on the scales about half obliterated. It evidently had not grown since marked, and was a small individual with the plastron  $4\frac{3}{4}$  inches.

The Box Turtle is numerous at Mastic, and during the past three or four years a number have been marked with the idea that the ability to recognize individuals might bring out interesting points concerning growth or habits. Very few have been found a second time.

One which was picked up July 15, 1916, perhaps one-half mile from the house, and liberated at the house on the following day, was found again on June 9, 1917, near its original locality.

One found and liberated near the house on July 9, 1916, was found in the same locality on July 5, 1917.

On June 18, 1916, one was taken on a bay meadow about one mile from the house, an unusually wet locality for the species, and liberated at the house. September 4th of the same year, it was found swimming along the bay side of the same meadow close under the bank.

Perhaps some reader of COPEIA can furnish further information as to whether individual Box Turtles have definite narrow territories which they frequent and to which they will return. The above instances are so few that they may be due to coincidence. The *Forest and Stream* article already referred to speaks of the faithfulness of an old turtle to one narrow locality.

As regards this species' habit of eating mushrooms, Latham says (COPEIA No. 34), that at Orient *Russula obscurus* is devoured almost exclusively.

On June 25, 1916, a Box Turtle was taken at the edge of a Mastic wood road beside a large *Boletus scaber* of which it had eaten a considerable portion of the side. This particular *Boletus* is said to be an excellent table species.

Fifty-three more or less full-grown Box Turtles which have been measured at Mastic had plastron length.

4½	to	4⅝	inches	.....	2
4¾	"	4⅞	"	.....	10
5	"	5⅛	"	.....	10
5¼	"	5⅜	"	.....	15
5½	"	5⅝	"	.....	13
5¾	"	5⅞	"	.....	3

J. T. NICHOLS,  
New York, N. Y.



